

applicant has modified this claim to recite that it is the ends of the bar that are being bent.

In respect to the examiner objections to claims 10, 31, 32, 38, 41, 44, 51, and 52, applicant has modified these claims to remove the words "preferably" and "some" and "about" and has in addition modified claims 31 and 32 to clear up the ambiguity in respect to the single piece recitation therein.

In respect to the indicated allowable dependent claims 3, 5, 15, 17, and 40, applicant has amended these claims into their indicated allowed independent form.

In respect to the examiner's rejection of claims 1, 2, 4, 14, 16, 22, 24, and 27 based on the newly cited Ratowski reference, applicant has amended these claims to recite that the bar with "wings" forms the "primary ground engaging drive connection for the shoe" as later described. This is believed to differentiate over Ratowski which has as its invention a modified straight bar.

The Ratowski reference teaches that his invention is a series of offsets 26, 27, 33, 34 which are said to provide increased lateral traction against slide slippage in an otherwise straight bar (col 2 lns 63-69). This grouser bar is taught to be of narrow width with the series of right-angled tractive offsets on the straight bar between the ends thereof affording lateral traction (col 1 lns 34-40). This is said to provide increased traction in respect to the usual non-offset straight grousers (col 1 lns 24-27). The cited

"bar 20" in Ratowski is a reinforcement rib 20 which has a central portion tapering downwardly at 20C towards the plane of the plate 11 (col 2 lns 6-17; fig 2). The actual grouser bar 25 in Ratowski is straight and taught to be a "bar of substantially greater height than the rib 20" (col 2 lns 23-24; figs 2, 3).

Ratowski's actual ground engaging bar 25 (grouser 25) is straight and different than the cited reinforcing rib 20.

In contrast, applicant's claimed winged bar is the primary ground engaging drive interconnection (pg 11 lns 4-6).

To clarify the distinctiveness of the present invention over the offset straight bar in Ratowski and its reinforcing rib, applicant has amended the pending independent claims to recite that the bar of the applicant's invention extends upwardly off of the pad to form the "primary ground engaging drive connection for the shoe" (see pg 11 lns 4-5, 14-19; pg 1 ln 15; pg 13 lns 3-15; pg 22 ln 21-pg 23 ln 1).

In view of the importance of the winged bar in the applicant's claimed invention, it is believed that a rejection based on Ratowski should not be maintained: Ratowski has offsets 26, 27, 33, 34 in order to provide lateral traction with the rib 20 added at a significantly lower height for reinforcing purposes.

In that the presently claimed invention distinguishes over Ratowski, it is not believed that a specific discussion of the

further differentiations of actual clauses specific to the various independent and dependent claims is warranted at the present time.

Favorable action is solicited.

Respectfully submitted,

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Claims

Claim 1. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and an end, the shoe comprising the bar being of uniform thickness and being integral with the pad, the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe,

the center of the bar having a center straight section with a center axis,

the end of the bar having an end axis, said end axis being angled in respect to said center axis to form a wing at the end of the bar.

Claim 2. The grouser shoe of claim 1 wherein the bar has a second end and characterized in that the second end has a second end axis,

and said second end axis being angled in respect to said center axis to form a second wing at the second end of the bar.

Claim 3. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and an end, the bar has a second end,

the shoe comprising the bar being of uniform thickness and being integral with the pad,

the center of the bar having a center straight section with a center axis,

the end of the bar having an end axis, said end axis being angled in respect to said center axis to form a wing at the end of the bar,

the second end has a second end axis, said second end axis being angled in respect to said center axis to form a second wing,

and said second end axis being differentially angled in respect to said center bar than said end axis.

Claim 4. The grouser shoe of claim 1 characterized in that the center of the bar has a center height, the end of the bar has an end height, and said center height being greater than said end height.

Claim 5. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and an end, the end has a length,

the shoe comprising the bar being of uniform thickness and being integral with the pad,

the center of the bar having a center straight section with a center axis,

the end of the bar having an end axis, said end axis being angled in respect to said center axis to form a wing at the end of the bar,

the second end has a second end axis, said second end axis being angled in respect to said center axis to form a second wing at the second end of the bar,

the second end having a second length, and said second length being different than said length.

Claim 6. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and an end,

the shoe comprising the bar being of uniform thickness and being integral with the pad, the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe,

the center of the bar having a center axis,

the end of the bar having an end axis, said end axis being angled in respect to said center axis to form a wing at the end of the bar,

the bar being formed separately from the pad, and the bar and pad being joined to form the shoe.

Claim 7. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and an end,

the shoe comprising the bar being of uniform thickness and being integral with the pad, the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe,

the center of the bar having a center axis,

the end of the bar having an end axis, said end axis being angled in respect to said center axis to form a wing at the end of the bar,

the bar being formed separately from the pad and welded onto the pad.

Claim 8. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and an end,

the shoe comprising the bar being of uniform thickness and being integral with the pad, the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe,

the center of the bar having a center axis,

the end of the bar having an end axis, said end axis being angled in respect to said center axis to form a wing at the end of the bar,

the bar being formed separately from the pad with part of the bar being differentially hardened in respect to the pad.

Claim 9. The grouser shoe of claim 7 characterized in that the bar is differentially hardened, and the hardness of the bar approximating that of the pad along the joint thereto.

Claim 10. The grouser shoe of claim 8 characterized in that the bar joints the pad at a joint and the pad has a Rockwell hardness,

said Rockwell hardness being in the range of 30-40 Rc and the bar has a hardness substantially similar to that of the pad at its joint therewith with its hardness increasing substantially uniformly outwardly therefrom to substantially 50-55 Rc.

Claim 11. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and an end,

the shoe comprising the bar being of uniform thickness and being integral with the pad, the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe,

the center of the bar having a center axis,

the end of the bar having an end axis, said end axis being angled in respect to said center axis to form a wing at the end of the bar,

the bar and pad being formed as a single piece, with the end of the bar being sheared from the pad, bent, and then reattached to the pad to form said wing.

Claim 12. The grouser shoe of claim 11 characterized in that the bar has ends, with said ends being sheared from the pad, bent, and then reattached to the pad to form the wings.

Claim 13. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and an end, the shoe comprising the bar being of uniform thickness and being integral with the pad, the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe,

the center of the bar having a center axis,

the end of the bar having an end axis, said end axis being angled in respect to said center axis to form a wing at the end of the bar,

the ends of the bar and pad being attached by welding.

Claim 14. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and two ends,

the shoe comprising the bar being of uniform thickness and being integral with the pad, the bar extending upwardly off of the

pad to form the primary ground engaging drive connection for the shoe,

the center of the bar having a center straight section with a center axis, both ends of the bar having end axes respectively,

and said end axes being angled in respect to said center axis to form wings at the end of the bar.

Claim 15. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and two ends, the shoe comprising the bar being of uniform thickness and being integral with the pad,

the center of the bar having a center straight section with a center axis, both ends of the bar having end axes respectively,

said end axes being angled in respect to said center axis to form wings at the end of the bar,

and said first and second end axes are differentially angled in respect to said center axis.

Claim 16. A grouser shoe of claim 14 characterized in that the bar has a center and two ends, said center and two ends each having a height, and said center height being greater than said end heights.

Claim 17. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and two ends, the shoe comprising the bar being of uniform thickness and being integral with the pad, the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe,

the center of the bar having a center straight section with a center axis, both ends of the bar having end axes respectively,

said end axes being angled in respect to said center axis to form wings at the end of the bar,

the two ends have specified lengths, and said specified lengths being different respectively.

Claim 18. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and two ends, the shoe comprising the bar being of uniform thickness and being integral with the pad, the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe,

the center of the bar having a center axis, both ends of the bar having end axes respectively,

and said end axes being angled in respect to said center axis to form wings at the end of the bar,

the bar being formed separately from the pad, and the bar and the pad being joined to form the shoe.

Claim 19. The grouser shoe of claim 18 characterized in that the bar is welded onto the pad.

Claim 20. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and two ends, the shoe comprising the bar being of uniform thickness and being integral with the pad, the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe,

the center of the bar having a center axis, both ends of the bar having end axes respectively,

and said end axes being angled in respect to said center axis to form wings at the end of the bar,

the bar being differentially hardened in respect to the pad.

Claim 21. The grouser shoe of claim 20 characterized in that the bar is integral with the pad at a joint and has a hardness, said hardness approximating that of the pad along the joint therewith.

Claim 22. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and two ends, the shoe comprising the bar being of uniform thickness and being integral with the pad, the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe,

the center of the bar having a center axis, both ends of the bar having end axes respectively,

and said end axes being angled in respect to said center axis to form wings at the end of the bar,

the bar and pad being formed as a single piece, with the ends of the bar being sheared from the pad, bent, and reattached integrally to the pad to form said wings.

Claim 23. A grouser shoe for a tracked vehicle, the grouser shoe having a pad and a bar with a center and two ends,

the shoe comprising the bar being of uniform thickness and being integral with the pad, the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe,

the center of the bar having a center axis, both ends of the bar having end axes respectively,

and said end axes being angled in respect to said center axis to form wings at the end of the bar,

the ends of the bar being welded to the pad to reattach said wings.

Claim 24. A grouser shoe for a tracked vehicle comprising a pad and an integral bar, said bar having a center and two ends, the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe,

said center having a straight section with center axis and each end having an end axis respectively, and said end axes being angled in respect to said center axis of said straight section to form wings.

Previously Cancel Claim 25.

Claim 26. In a grouser shoe having a pad with a leading edge, the improvement of a wear bar, said wear bar being replaceably separately attached to the pad at the leading edge thereof.

Claim 27. A grouser shoe having a bar with a center and an end, the improvement of the center of the bar being straight and end of the bar being angled in respect to the center of the bar, and the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe.

Claim 28. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad and forming a bar having a uniform thickness with a straight center section and two ends,

the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe,

bending the ends of the bar in respect to said straight section to form wings, and attaching the wings to the pad.

Claim 29. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad and forming a bar having a uniform thickness with a center and two ends,

bending the ends of the bar to form wings, attaching the wings to the pad, and forming of the pad separately from the forming of the bar.

Claim 30. A method of claim 29 characterized in that the center and both ends of the bar are fixedly attached to the pad.

Claim 31. A method of claim 28, said method comprising the additional step of shearing the ends of the bar to form the wings.

Claim 32. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad and forming a bar having a uniform thickness with a center and two ends, bending the ends of the bar to form wings, attaching the bar to the pad, shearing the ends of the bar to form the wings, welding the sheared ends of the bar back to the pad, and

the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe.

Claim 33. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad and forming a bar having a uniform thickness with a center and two ends, bending the ends of the bar to form wings, attaching the wings to the pad, and the ends of the bar being bent to form wings of different lengths.

Claim 34. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad and forming a bar having a uniform thickness with a center and two ends,

the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe,

bending the ends of the bar to form wings, attaching the wings to the pad, and the end of the bar being bent to form an angle between 10-20° between such end and the center of the bar.

Claim 35. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad and forming a bar having a uniform thickness with a center and two ends, bending the ends of the bar to form wings, attaching the wings to the pad, and the ends of the bar being bent to form wings having different angles between the ends and the center of the bar respectively.

Claim 36. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad and forming a bar having a uniform thickness with a center and two ends,

the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe,

bending the ends of the bar to form wings, attaching the wings to the pad, and the grouser shoe being treated to alter the physical properties of the bar.

Claim 37. A method of claim 36 characterized in that the grouser shoe is differentially heat treated such that the bar has a hardness substantially similar to that of the pad at the joint therewith, and said hardness of the bar increases outwardly therefrom.

Claim 38. A method of claim 37 characterized in that the pad has a Rockwell hardness, said Rockwell hardness being typically

in the range of 35-40 Rc and the bar has a Rockwell hardness, said Rockwell hardness being substantially 50-55 Rc at its outer edge.

Claim 39. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad having a flat piece,

separately forming a bar of uniform thickness, the bar having a center and two ends, the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe,

the center having a center axis and each end having an end axis respectively,

forming wings by bending the ends of the bar to produce an angle between the center axis and each respective end axis to create a bar having a "C" shaped cross section,

and attaching the bar to the pad.

Claim 40. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad having a flat piece,

separately forming a bar of uniform thickness, the bar having a center and two ends,

the center having a center axis and each end having an end axis respectively,

forming wings by bending the ends of the bar to produce an angle between the center axis and each respective end axis to create a bar having a "C" shaped cross section,
attaching the bar to the pad, and
the wings are of different lengths.

Claim 41. A method of claim 39 characterized in that the angle between the center axis and the respective end axis is between 10-20°.

Claim 42. A method of claim 39 characterized in that the wings have different angles between the center axis and each respective end axis.

Claim 43. A method of claim 39 characterized in that the grouser shoe is differentially treated such that the bar has a hardness substantially similar to that of the pad at the joint therewith, and said hardness of the bar increasing outwardly therefrom.

Claim 44. A method of claim 43 characterized in that the pad has a Rockwell hardness of about 35-40 Rc and the bar has a hardness of substantially 50-55 Rc at its outer edge.

Claim 45. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad having a flat piece and an integral bar,

the bar being of uniform thickness and having a center and two ends, the center having a center axis and each end having an end axis, respectively,

shearing the ends of the bar from the pad,

forming wings by bending the ends of the bar to produce an angle between the center axis and each respective end axis,

and reattaching the wings to the pad.

Claim 46. A method of claim 45 characterized in that the wings are of different lengths.

Claim 47. A method of claim 45 characterized in that the angle between the center axis and the respective end axis is preferably between 10-20°.

Claim 48. A method of claim 45 characterized in that the wings have different angles between the center axis and each respective end axis.

Claim 49. A method of claim 45 characterized in that the grouser shoe is differentially treated such that the bar has a

hardness substantially similar to that of the pad at the joint therewith, and said hardness of the bar increasing outwardly therefrom.

Claim 50. A method of claim 49 characterized in that the pad has a Rockwell hardness of about 30-40 Rc and the bar has a hardness of some 52-55 Rc at its outer edge.

Claim 51. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad having a flat piece with a leading edge and a trailing edge,

the width of the flat piece preferably being substantially 60-80% of the length of the pad,

the width of the leading edge preferably being substantially 10-20% of the length of the pad,

and the width of the trailing edge preferably being substantially 5-15% of the length of the pad,

separately forming a bar of uniform thickness, the bar having a center and two ends, the center having a center axis and each end having an end axis, respectively,

forming wings by bending the ends of the bar to produce an angle of substantially $10-20^{\circ}$ between the center axis and each respective end axis creating a bar having a "C" shaped cross section,

heat treating the pad to a hardness of substantially 35-40 Rc and differentially treating the bar to a hardness of substantially 50-55 Rc for 75% of its extremity and 35-40 Rc at its inner edge for joining with the pad,

attaching the bar to the flat piece of the pad, and the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe.

Claim 52. A method for manufacturing a grouser shoe for a tracked vehicle, said method comprising forming a pad having a flat piece with a leading edge, a trailing edge, and an integral bar,

the length of the flat piece preferably being substantially 60-80% of the width of the pad,

the width of the leading edge preferably being substantially 10-20% of the length of the pad,

the width of the trailing edge preferably being substantially 5-15% of the length of the pad,

the bar being of uniform thickness and having a center and two ends, the center having a center axis and each end having an end axis respectively,

shearing the ends of the bar from the pad,

forming wings by bending the ends of the bar to produce an angle of substantially 10-20 ° between the center axis and each

respective end axis creating a bar having a "C" shaped cross section,

reattaching the wings to the pad,

the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe,

and differentially heat treating the pad to a hardness of substantially 35-40 Rc and the bar to a hardness of substantially 50-52 Rc for 75% of its extremity and 35-40 Rc at its joint with the pad.

Claim 53. A method for manufacturing a grouser shoe, said method comprising forming a pad and forming a bar, the bar having a straight center and an end,

the bar extending upwardly off of the pad to form the primary ground engaging drive connection for the shoe,

including bending said end of the bar in respect to the straight center of the bar to form a wing and attaching said wing to said pad.